Commodore 64/128

STEALTH MISSION

STEALTH MISSION
Operating Manual

Written by Steve Setzler
Directed by Bruce Artwick

For Commodore 64/128 computers
Program Number CM-SM1

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SubLOGIC Corporation
713 Edgebrook Drive
Champaign, IL 61820
(217) 359-8482

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Introduction

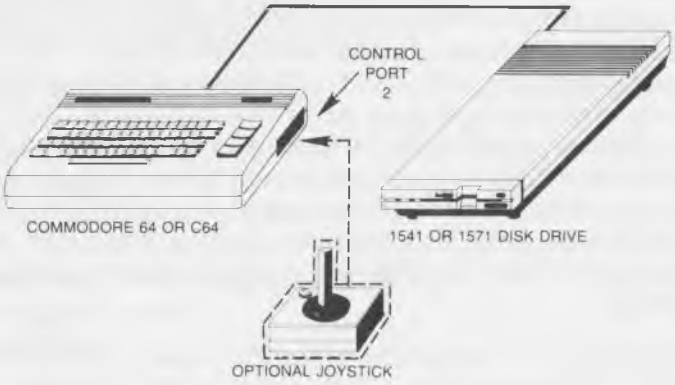
At SubLOGIC we are continually improving our comprehensive system of real-time three-dimensional display and simulation technologies for microcomputers. Stealth Mission is an application of these technologies in a realistic simulation of the F-19 Stealth, forward-swept wing X-29, and F-14 Tomcat jets. Although much of the information about these jets is classified TOP SECRET, we have obtained enough technical data about them to accurately simulate their flight characteristics, controls, and weapon and defense systems. All have tremendous power, agility, and different tactical strengths. Stealth Mission gives you the opportunity to fly each jet and test your skills in a variety of realistic combat situations.

The "black art" of electronic warfare (EW) now permeates the design of all modern military fighter aircraft. With the right combination of strategy and tactics, you have the technological capability of being completely invisible to your enemy. The same combination, if your enemy knows how to look for you, can turn you into an aerial lighthouse — the proverbial "sitting duck".

We hope Stealth Mission lives up to your expectations and provides some of the excitement of flying the real thing on missions requiring the ultimate in strategy and tactics!

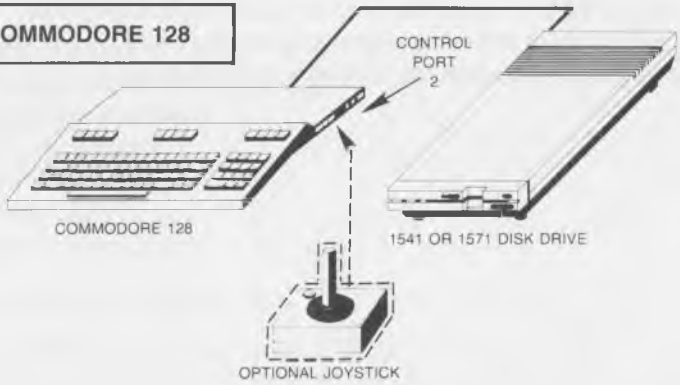
Running the Program

COMMODORE 64



1. Turn on disk drive and insert disk into drive.
2. Turn on C64 and type: LOAD "*",8,1 [return]
3. The program takes about three minutes to load.

COMMODORE 128



1. Turn on disk drive and insert disk into drive.
2. Turn on C128. The disk automatically boots.

Menu Selections

When Stealth Mission finishes loading from disk, the program's first menu screen prompts you to:

```
SELECT GAME MODE:

1 MISSIONS
2 LOAD SCENERY DISK
```

From here you can go directly to the mission selection menu, or load scenery disk information. Mission selections and preparations will now be covered in detail. Scenery disk use is covered in the "Load Scenery Disks" section of this manual.

Mission Selection Menu

When you select MISSIONS, the following menu is displayed:

```
MISSIONS:

1. MOUNTAIN CONFLICT EASY
2. MOUNTAIN CONFLICT ADVANCED
3. BATTLE AT SEA INTERMEDIATE
4. BATTLE AT SEA ADVANCED
5. ANCIENT RUINS EASY
6. ANCIENT RUINS ADVANCED
7. MARATHON BOMBER EASY
8. MARATHON BOMBER ADVANCED

PRESS 1-8 FOR THE DESIRED MISSION.
```

At this point you may choose from eight different missions by pressing the appropriate key. Two variations on each basic mission are provided — an easier version with fewer enemy em-

placements, and an advanced version that's more difficult to complete. These variations also require different combinations of strategies depending on the skill level you select. A short onscreen description of each mission is displayed when the appropriate key is pressed. Press [RETURN] to select a mission and go on to the next menu. See the "Missions" section of this manual for further information.

Skill Level/Options Menu

After you select a mission or load a scenery disk area, the screen displays:

```
SKILL LEVEL:
PRACTICE . . . MEDIUM . . . HARD
   0  1  2  3  4  5  6  7  8  9

AIRCRAFT:
A.  F-19   STEALTH
B.  X-29   EXPERIMENTAL
C.  F-14   TOMCAT

ARMAMENT
D.  0  AIM-9 SIDEWINDER      I.  0  MK-84 BOMB
E.  0  AIM-7 SPARROW         J.  0  GBU-528 BOMB
F.  0  AGM-65 MAVERICK       K.  0  AGM-84 HARPOON
G.  0  MK-81 BOMB            L.  0  STEALTH A-A
H.  0  MK-82 BOMB            M.  0  STEALTH A-G

F-19 FUELED: 25050 LBS.
ARMAMENT WEIGHT: 0 LBS.
TOTAL WEIGHT: 25050 LBS.

PRESS 0-9 TO CHANGE SKILL LEVEL, A-C TO
CHANGE AIRCRAFT, D-M TO CHANGE ARMAMENT.
PRESS RETURN WHEN DONE.
```

This is the screen where you select skill level, aircraft type, and armament.

The current skill level (0-9) is highlighted in black. Lower values are easier, higher values more difficult. You can change skill level at any time on this page by pressing keys [0] through [9]. At skill level 0 it is impossible to crash or get shot down. Skill level also determines the maximum descent rate at which you can touch down without crashing, the number of hits your aircraft can take before being destroyed, distance at which your aircraft can be detected by enemy radar, etc.

The currently selected aircraft is also highlighted in black. Any one of three different aircraft may be chosen on this page by pressing the appropriate key. You can change your mind and make a new selection as long as you are on this page.

Armament selections are made by pressing keys [D] through [M]. The number immediately following each letter on the selection menu indicates the currently selected quantity of that armament type. Armament is increased by one (to a maximum of 8) each time the appropriate key is pressed. Since eight of each weapon would be far too heavy for any one aircraft to carry, you must arm your aircraft with the most effective combination of ordnance to accomplish the set of goals for the mission you've selected. Total armament weight is calculated when you make your selections, and displayed along with total aircraft weight at the bottom of the screen. If your aircraft is too heavy to take off, this will also be noted onscreen. You will not be allowed to leave this menu until you either select another aircraft capable of taking off with the armament you've selected, or until the total weight of armament is reduced so that the selected aircraft can take off. Weapon selection and use is covered in the "Weapon and Defense Systems" section of this manual.

NAVY

Display and Instruments

Out the Window View

In flight mode the screen displays a view of the local scenery in front of the aircraft. At the start of each mission your aircraft sits on a runway at the home airbase where you are cleared and ready for takeoff. As you roll down the runway, take off and begin to fly, the display rapidly updates the view for your position and attitude. This perspective projection is generated from a true three-dimensional database. You can look to the front, left, right, rear, or straight up out of the cockpit. Additional views (spot plane, control tower, map, missile's eye view) are also available.

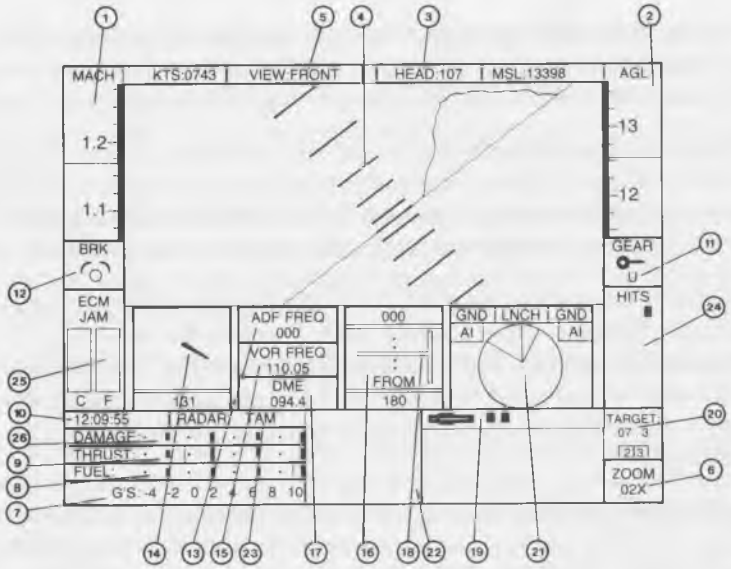
Heads Up Display (HUD)

The instruments grouped around the sides of the screen display are designed to allow quick readings with a minimum of outside viewing interference. Please refer to Figure 1 to determine instrument location.

Flight Instruments and Indicators

Air Speed Indicator (item 1): This "scrolling tape gauge" shows aircraft velocity in mach number (times the speed of sound). Actual airspeed in knots (KTS) is also displayed to the right of the MACH label in the upper left corner of the screen.

Altimeter (item 2): This scrolling gauge indicates altitude in thousands of feet Above Ground Level (AGL). Altitude in feet above Mean Sea Level (MSL) is also displayed in the upper right corner of the screen.



Flight Instruments/Indicators

1. Air speed indicator
2. Altimeter
3. Heading indicator
4. Attitude indicator
5. Pilot's view indicator
6. Zoom indicator
7. Frame loading indicator
8. Fuel level indicator
9. Thrust indicator
10. clock
11. landing gear status indicator
12. brake status indicator

Navigation Aids

13. ADF receiver
14. ADF bearing indicator
15. VOR receiver
16. VOR omni-bearing indicator
17. DME
18. ILS glideslope needle

Weapon/Defense Instruments

19. Weapons cycling window
20. Target-tracking computer
21. Raw scope
22. Radar display
23. Radar status indicator
24. Hits display
25. ECM display
26. Damage indicator

Figure 1. Stealth Mission Screen Display

Heading Indicator (item 3): This indicator shows the magnetic heading of the aircraft in degrees (0 to 359), where 0 degrees indicates north, 90 is east, 180 is south, and 270 is west.

Attitude Indicator (item 4): The attitude indicator is turned on and off with the [A] key. This instrument shows the pitch attitude of your aircraft (nose up, level, or down), and provides a visual indication of your degree of bank with respect to the ground.

A series of white lines marked in 10-degree increments above and below the horizon show aircraft pitch. Points at the top and bottom of the scale indicate 90-degree pitch angles. Bank angle of the aircraft is displayed by rotation of the pitch scale. This instrument is especially useful when the horizon is not visible out the window.

Pilot's View (item 5): This red box indicates your current out-the-window VIEW. Cockpit view directions include FRONT, RIGHT, REAR, LEFT, and TOP. Other available views include SPOT, TOWER, MAP, and MISSILE. See the Views section of this manual for further information.

Zoom (item 6): Window views can be magnified from 1X to 16X (map view to 36X). This indicator lists the current ZOOM factor of your out-the-window or map view.

Frame Loading (item 7): This indicator displays G-forces exerted on the aircraft perpendicular to the wing surface, where one G equals the force of gravity. If frame loading has a negative value, the force is upward with respect to the wings. This instrument is important because of the human body's limited tolerance to high acceleration. If frame loading exceeds 9 Gs you will black out due to blood draining from the head. If frame loading goes below -3 Gs, you will "red out" as blood rushes to your head. This indicator is read by noting the length of the blue indicator bar either to the right or left of the zero-G center marker.

Fuel Level Indicator (item 8): This instrument indicates the amount of fuel remaining. The blue indicator bar decreases in length from right to left to indicate your rate of fuel use, and flashes red and blue when less than one-eighth of a tank of fuel is left.

Thrust Indicator (item 9): This blue indicator bar extends from left to right to show the percentage of throttle being used. The bar turns red when afterburners are engaged on the F-14 or X-29. The F-19 does not have afterburners.

Clock (item 10): This is a 24-hour clock that displays hours, minutes, and seconds.

Landing Gear (item 11): The GEAR icon shows the status of your landing gear. A red icon with extended landing gear illustration shows that landing gear is (D)own, and a cyan icon indicates the landing gear is (U)p.

Brakes (item 12): The BRK icon displays brake status. Wheel brakes are referred to when on the ground, and airbrakes when airborne. A cyan icon shows that the brakes are not being applied. A red icon indicates that brakes are in use.

Navigation Aids

Stealth Mission includes four of the most commonly used navigational aids: ADF (Automatic Direction Finder), VOR (Very high frequency Omnidirectional Range), DME (Distance Measuring Equipment), and ILS (Instrument Landing System).

Radio nav-aids are displayed on a pop-up instrument panel that can be turned on and off at any time. 30% more viewing screen area is available when these instruments are turned off. Press [I] to toggle the pop-up instrument panel on and off.

Automatic Direction Finder (ADF): The ADF consists of an ADF FREQ receiver (item 13) and a bearing indicator (item 14). This instrument is used to tune Non-Directional radio Beacons (NDBs).

Very High Frequency Omnidirectional Range (VOR): The VOR consists of a VOR FREQ. receiver (item 15) and an Omni-Bearing Indicator (OBI) (item 16). This instrument is used to tune VOR transmitters.

Distance Measuring Equipment (DME): This instrument (item 17) displays distance in nautical miles to the tuned VOR station. If no active VOR is tuned or the tuned VOR is out of range, the DME displays dashed lines only.

Instrument Landing System (ILS): The horizontal glideslope needle located on the Omni-Bearing Indicator (item 18) is used in conjunction with airport ILS transmitters to coordinate a landing approach.

Weapon/Defense Instruments and Indicators

Fire Control Display: This display consists of a weapons cycling window (item 19) and a target-tracking computer (item 20). An orange bar in the weapons cycling window indicates your selected weapon. Other available weapons are listed below this. Small squares to the right of each weapon icon indicate the quantity remaining.

The TARGET computer tracks all potential targets for the current selected weapon, and displays distance in nautical miles to the target currently being tracked. This computer must be used to lock onto enemy targets before you can fire your weapons at them.

Raw Scope (item 21): This instrument lets you monitor active radar systems external to the aircraft. GND and AI icons indicate active radar signals emanating from ground and/or air-intercept

locations, and a flashing LNCH icon indicates enemy missiles launched. The raw scope is located on the pop-up instrument panel (toggled on on and off with the [I] key).

Radar Display: Radar is toggled on and off with the [W] key. This instrument (item 22) displays the relative locations of potential surface targets, airborne targets, and missiles within a range of twenty nautical miles.

A cyan RADAR: T A M icon (item 23) located to the right of the clock indicates whether ground (T)argets, (A)ircraft, and/or (M)issiles are included in the radar display.

Hits (item 24): This display box keeps track of your hits on ground and air targets. The box is divided into four columns. The two left columns keep track of hits made against air targets, and the two right columns keep track of ground target hits.

Electronic Counter-Measures (ECM): Stealth Mission jets use three different types of ECM; radar jamming, chaff, and flares. The JAM label on the ECM display (item 25) flashes to indicate when active radar jamming is taking place. Vertical orange indicator bars labeled C and F indicate the amount of Chaff and Flares remaining.

Damage Indicator (item 26): This blue indicator bar shows the amount of damage your aircraft has sustained. Twelve separate systems are monitored for damage as you fly, and total aircraft damage is indicated by the length of the bar.

Flying the Aircraft

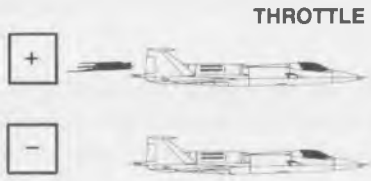
All three Stealth Mission jets utilize "fly by wire" flight-surface controls. This refers to a system of aircraft control where the pilot sends steering commands to a computer, which in turn generates actual elevator and aileron movement. With this system the pilot need only point the aircraft in the desired direction and the computer will keep it flying that way. Since the X-29 can generate more pounds of thrust than it weighs, it can accelerate vertically (straight up) and is considered ballistic. This simplifies aircraft control by allowing any angle of controlled flight. The F-19 and F-14 will eventually stall if you attempt to climb vertically.

Flight Controls

Stealth Mission provides five flight operation controls: throttle, elevator, aileron, landing gear, and air brakes. Rudder operation is coordinated with aileron movement, not controlled separately. These controls will now be covered.

Throttle

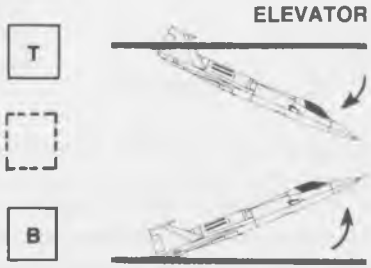
The throttle controls the amount of thrust generated by the engine. The [+] and [-] keys increase and decrease thrust respectively, while [SHIFT][+] or [SHIFT][-] bring you immediately to full thrust or idle.



When the F-14 and the X-29 are at full thrust, one more [+] keypress activates the afterburners and turns the thrust indicator bar red. A [-] keypress turns afterburners off and returns you to full thrust. The F-19 Stealth aircraft does not have afterburners since these would compromise its stealth radar profile.

Elevator Control

The elevator controls the pitch attitude of the aircraft. Press the [B] key or pull back on the joystick to pitch the aircraft up. If you have enough airspeed, this will raise the nose. Press [T] or push forward on the joystick to pitch down.



Aileron Control

Ailerons control the aircraft's bank angle. Press the [F] key or push left on the joystick to bank the aircraft to the left (spin counter-clockwise). Press [H] or push right on the joystick to bank right (spin clockwise).

Aileron and elevator keyboard controls are centered around the [G] key. When using the keyboard for elevator/aileron control, note that the more times you press a control key, the faster the aircraft rotates. You must press [G] to center the ailerons and elevator in order to halt aircraft rotation. When using a joystick,

elevator and aileron controls are automatically centered when the joystick is released.

Pressing [SHIFT][G] automatically return the aircraft to a straight and level flight path.

Landing Gear

Landing gear must be used for all ground maneuvering. You cannot raise the landing gear while on the ground. Once airborne, you should raise the landing gear to lower air drag on your aircraft and increase your top speed. If you attempt to land with the gear up you will crash. (When flying at skill level 0, the gear is lowered automatically when you come in for a landing.) Press the [CTRL][G] keys to raise and lower the landing gear. The GEAR icon indicator displays landing gear status.

Brakes

The BRK icon indicator displays your brake status. Wheel brakes are referred to when on the ground, and airbrakes when airborne. Wheel brakes are used for ground maneuvering, airbrakes are used for landings and for quick mid-air deceleration. Both brakes types are toggled on and off with the [CTRL][B] keys.

Sample Flight

1. Load Stealth Mission. When the main menu prompts you to select a game mode, press the [1] key to select MISSIONS.

2. From the missions selection menu, press [1] to choose MOUNTAIN CONFLICT EASY, then press [RETURN] to go on to the options menu.

3. On the options menu, press [0] to select skill level 0 and then [A] to select the F-19 aircraft. Press [L] five times to arm your jet with 5 Stealth air-to-air missiles, and [M] five times to select 5 Stealth air-to-ground missiles. Press [RETURN] when you're ready to begin the mission.

4. Press [A] to turn on the attitude indicator, then [R] to enable the targeting computer and turn on the targeting crosshairs. Before taking off, note that you can pause the simulation at any time by pressing the [P] key, and resume flying by pressing [P] again.

5. Press [SHIFT][+] to throttle up to full power. Press [B] six times or pull back on the joystick to give yourself some up elevator. Once you've left the ground, press [CTRL][G] to raise landing gear.

6. Press [G] to center the elevator when the pitch attitude of your aircraft reaches 20 degrees (the second line above the horizon on the attitude indicator). Press [5][B] to look back at your home base airport, and [5][T] to return to forward view.

7. Start the aircraft into a right bank by pressing [H] four or five times. Wait several seconds, then press [G] to center the ailerons and stop increasing bank angle. Bank to a heading of 50 degrees, then press [SHIFT][G] to select auto-leveling (return to straight and level flight).

8. Press [F3] to select spot plane view and watch yourself fly, then [F1] to return to cockpit view. Press [CTRL][X] to turn off the ground grid pattern. Turn off the attitude indicator by pressing [A].

9. Press [RETURN] until the Stealth air-to-ground missile icon is highlighted in the orange bar in the weapons cycling window. Continue flying until a distance-to-target figure appears on the target-tracking computer, then press [-] as many times as necessary to reduce throttle to 50%.

10. When a red targeting box is superimposed over the target in the out-the-window view, use aileron and elevator controls to maneuver your aircraft and center the targeting crosshairs inside the targeting box. Press [L] twice to lock the target into the targeting computer two times, then press [SHIFT][G] to auto-level your aircraft.

11. When the target-tracking computer indicates that you are 12 miles from the target, press the [space bar] twice to fire both missiles. Press [F7] to select missile's eye view for the first

missile fired; press [F7] one or more times again to toggle between both missiles' eye views.

12. Press the [-] key to reduce throttle to 25%. At least one of your missiles should hit the primary target. A message will be displayed on the screen to indicate that a primary target has been hit. You automatically revert to cockpit view when the missile from which you are watching impacts the target.

13. Press [I] to turn on the pop-up instrument panel. Make sure that your VOR is tuned to a frequency of 110.05 (press [:] and [;] to adjust it if necessary) and the OBI is set to 000 (adjust with the [@] and [*] keys).

14. Press [SHIFT][+] to return to full throttle, and press [CTRL][A] to initiate the automatic landing procedure. The onboard computer will return you to home base and land the aircraft automatically.

Refueling

The FUEL level indicator shows the amount of fuel remaining, and lets you know when you must refuel at either a land base or a refueling plane. The blue indicator bar extends from left to right. As you fly, the bar decreases in length from right to left to indicate your rate of fuel use. Fuel consumption goes up proportionally as throttle is increased. With afterburners on, fuel consumption is doubled.

The fuel level indicator bar flashes red and blue when you have less than one-eighth of a tank of fuel left. If you run out of fuel the engine(s) will flame out and you will have to attempt a "dead stick" landing.

To refuel your aircraft, you may land at your home base or at any airfield where a fuel supply is available. Look for an airstrip displaying a small box with the letter "F" inside of it. Airfields

other than your home base will often be defended by enemy forces that must be dealt with before refueling can be accomplished. You must land your aircraft, come to a stop inside the labeled refueling area, and press [CTRL][R] to refuel your jet. You must refuel completely before any repairs and/or re-arming can be done.

Automatic Refueling Procedure

If no airports with fuel are nearby, you will have to search out the KC-10 refueling tanker that always circles the mission area (see illustration below). This tanker can be located by tuning your ADF to frequency 001. The ADF pointer needle indicates the tanker's bearing in degrees relative to your current heading. An alternate method of location is to tune your VOR to 110.15 Mhz and use the Omni-Bearing Indicator needle to fly toward the tanker. When using VOR, distance from your aircraft to the refueling tanker is displayed on the DME gauge. See the "Navigation" section of this manual for more information on ADF and VOR use.

Docking with the refueling tanker can be very difficult, so your onboard computer is programmed with an automatic refueling procedure to locate the tanker, fly to it, and refuel, re-arm, and repair the aircraft. Depending on skill level, you must first fly yourself within range of the tanker. This range varies from 200 miles (at skill level 1) to 15 miles (at skill level 9). At skill level 0 you can return to the tanker from any distance if you have enough fuel and aren't hopelessly damaged. Press [CTRL][R] to initiate the automatic refueling procedure. Press [CTRL][R] again to disengage auto-refueling.

Automatic Landing Procedure

The onboard flight computer is also programmed to automatically land the aircraft without human assistance. Depending on skill level, initiating the automatic landing procedure by pressing [CTRL][A] can bring you back to your home base airport from anywhere (at skill level 0), or from within 200 miles range (at skill level 1) to within 15 miles range (at skill level 9). The flight computer will track your home base VOR and fly the aircraft straight back to it when this procedure is initiated. It will not avoid mountains or any other obstacles in the flight path, so stay alert. Press [CTRL][A] again to abort auto-landing at any time.

The automatic landing procedure is programmed to fly you to the currently-tuned VOR and land the aircraft on the current OBI course selector heading. You must turn on the pop-up instrument panel (press [I]), set VOR FREQ to the desired airport VOR frequency, and set the OBI course selector to an appropriate runway heading before initiating this procedure. The VOR FREQ receiver is initially tuned to your home base airport VOR. Runway headings vary by airport, so be sure that the heading you specify on the OBI is appropriate for the airport at which you want to land. VOR and OBI adjustments are covered in the "Navigation" section of this manual. All Stealth Mission flight control keys are listed in Figure 2.

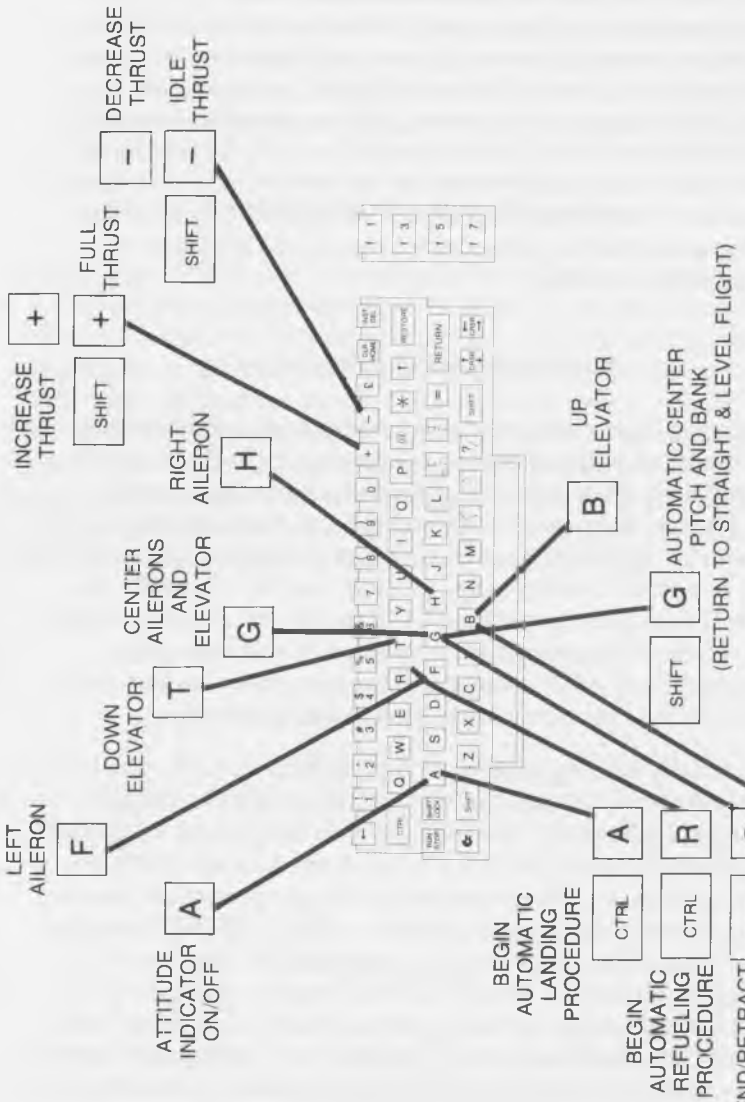


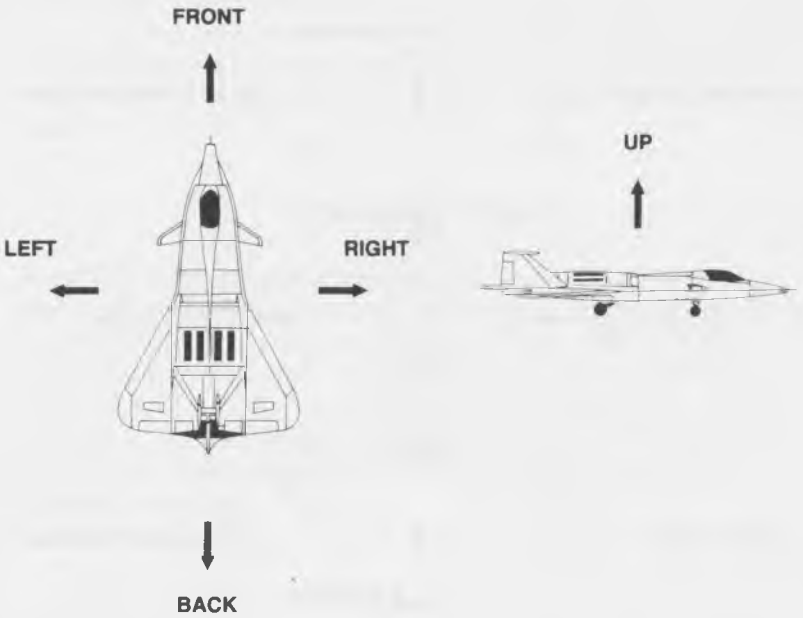
Figure 2. Stealth Mission Flight Controls

View Controls

In normal flight mode, the out-the-window display is from the cockpit point of view. Additional views (spot plane, control tower, map, missile's eye view) are also available, and you can zoom in and out on each view.

Cockpit

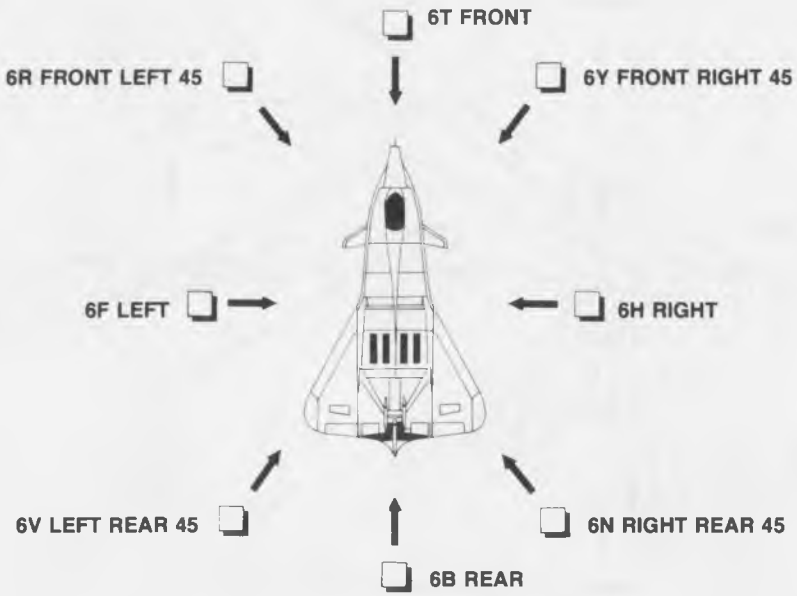
Cockpit view control keys are centered around the [G] key. Press [5] followed by [T], [H], [B], [F], or [G] to select the FRONT, RIGHT, REAR, LEFT, or TOP cockpit view direction respectively. Your current viewing direction is listed in the red VIEW box located at the top left-center of the heads up display. Press [F1] to return to cockpit view from other viewpoints.



Spot Plane

In spot plane viewing mode, the out-the-window display shows your aircraft from the point of view of a spotter aircraft flying next to you. You can adjust this spotting plane's location, distance, and altitude relative to your own aircraft.

Press [F3] to select spot plane view. The red VIEW box on the heads up display indicates that SPOT view is active. To change the location of the spot plane relative to your own aircraft, press [6] followed by one of the placement keys centered around the [G] key (where [G] represents your aircraft's location and heading). Press [6] followed by [T], [Y], [H], [N], [B], [V], [F], or [R] to place



the spot plane in that location relative to your position. Use the [left/right CRSR] or [SHIFT][left/right CRSR] keys to move the spot plane closer or farther away respectively. Use the [up/down CRSR] or [SHIFT] [up/down CRSR] keys to move the spot plane down or up relative to your aircraft.

Control Tower

Press [C] to select control tower view. This is the view of your aircraft from a control tower located at the home base airport. View direction is fixed towards the aircraft, and tracks you as you fly. The VIEW box lists TOWER as the current view.

Map

The map display provides a detailed view of the area over which you are flying. This view is especially useful for navigation, and for taxiing around airports. You can use the [Y] and [N] keys to zoom way in or way out on this display. Press [F5] to select the map.

Missile's Eye View

Press [F7] to select missile's eye view. This shows the view from one or more active missiles and/or bombs as they track and home in on their respective targets. Pressing [F7] repeatedly toggles between all active missile viewpoints (up to 8). The VIEW box lists MSL1, MSL2, etc., to indicate the current missile view being displayed. The out-the-window display automatically reverts to cockpit view when the missile from which you are watching impacts the target.

Zoom Control

Zoom control is used to adjust the magnification factor of your out-the-window view, or to zoom in and out on the map display. Window views can be magnified from 1X up to 16X. Press [Y] to double the zoom factor and [N] to halve it. The current ZOOM factor is listed in the lower right corner of the heads up display.

You can zoom in or out on the map display (press [Y] or [N]) much more than on an out-the-window view. Zoom factor is doubled with each [Y] keypress. The ZOOM indicator displays a relative value from 1X to 36X to show the current zoom factor.

Display Options

Several out-the-window display options can be used to increase overall animation speeds. These features are optional because they decrease simulation realism:

Press [CTRL][X] to toggle the ground grid pattern on and off. This increases animation speed slightly but greatly decreases your sense of movement when flying between databases.

Press [O] to toggle shading on and off. When shading is turned off, all 3D objects are displayed in wire-frame perspective only.

Press [CTRL][F] to turn off the entire scenery database. Only enemy ground and air targets are displayed when this option is selected. This can greatly increase animation speeds when ground scenery visual cues are not necessary (when performing aerobatic maneuvers, for example), or when quicker control response is required (e.g. in a dogfight, or when negotiating hairpin turns). Press [CTRL][F] again to turn scenery back on.

All view controls are listed in Figure 3.

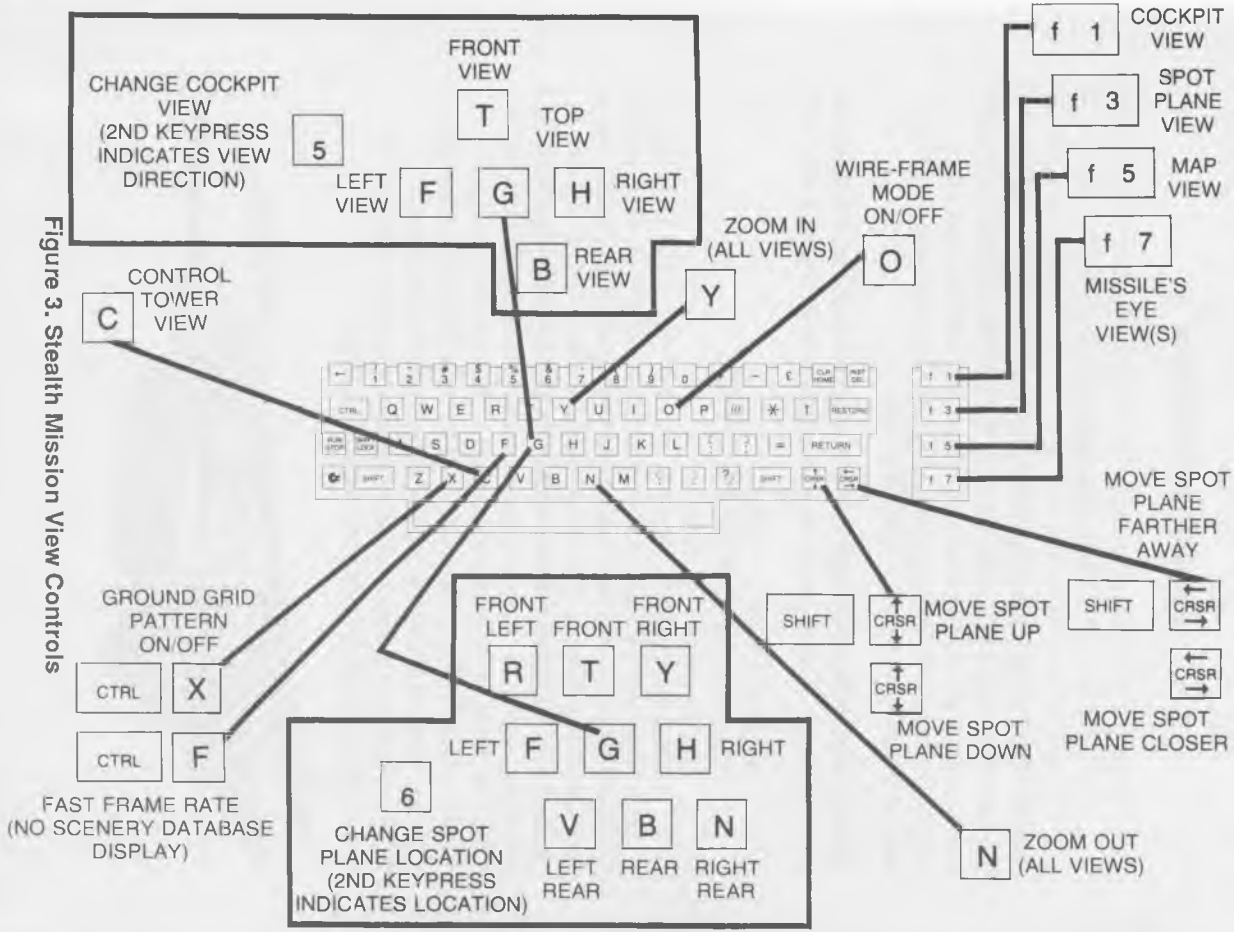


Figure 3. Stealth Mission View Controls

Simulation Controls

Time Adjustment

Stealth Mission operates in three distinct visual flight periods: day, dusk/dawn, and night. During the day the sun tracks realistically across the sky from east to west, and can be used as an approximate heading indicator. At night, the stars and constellations are visible in their proper locations.

Your jet uses a 24-hour digital clock to allow consideration of AM and PM times. Visual mode switch-over transition times are:

Night to Dawn - 6:00
Dawn to Day - 6:30
Day to Dusk - 18:00
Dusk to Night - 18:30

Clock time can be manually adjusted to let you fly a stealth mission at any time of the day or night. Press [CTRL][T] to turn on the clock time-adjustment cursor. Press the [left/right CRSR] key to select hours, minutes, or seconds. (Use [SHIFT][left/right CRSR] to back up the selector cursor.) Then press [up/down CRSR] or [SHIFT][up/down CRSR] to increase or decrease the selected hour, minute, or second time respectively. Press [CTRL][T] again to exit and save the changes you've made, or [RETURN] to exit without saving any changes.

Sound

Press the [S] key to toggle sound on and off.

Simulation Pause

Press [P] to pause the Stealth Mission simulation at any time. The jet's clock continues to run when this option is selected. An onscreen indicator reminds you that you have paused the program. Press [CTRL][P] to pause without displaying the onscreen indicator. Press [P] again to return to flight mode.

Simulation Reset

Press [SHIFT][RUN STOP] to quit the simulation at any time and return to the startup menu.

Scenery Disk Log-in

Press [CTRL][S] to log-in a new scenery disk, or to log-in a scenery disk for the adjacent area when crossing a scenery disk boundary. See "Loading Scenery Disks" for further information.

All Stealth Mission simulation controls are listed in Figure 4.

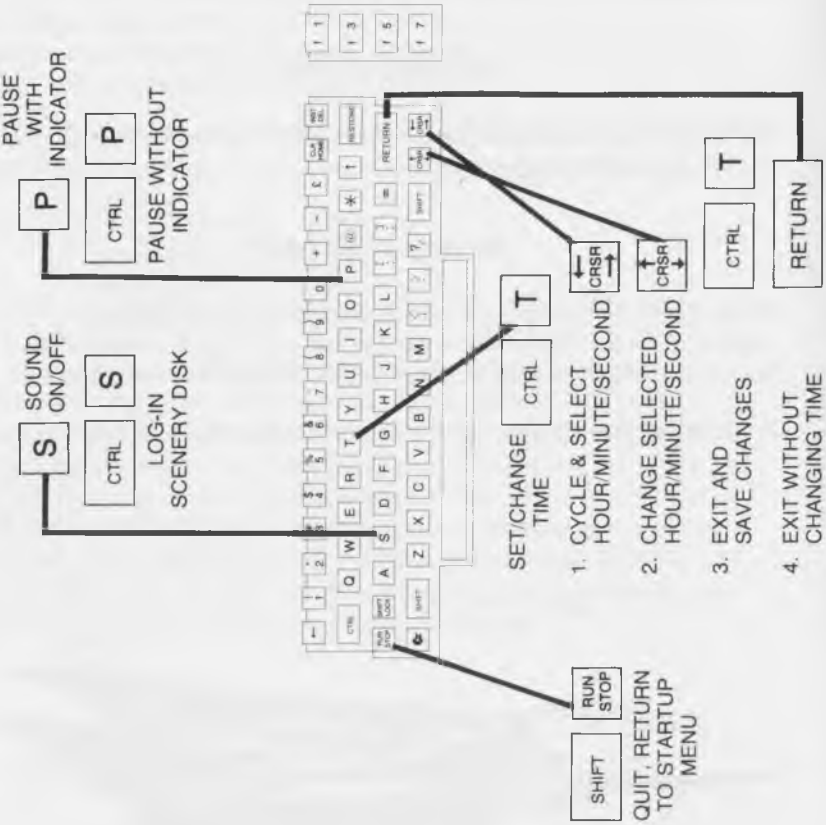


Figure 4. Stealth Mission Simulation Controls

Navigation

Stealth Mission uses four of the most commonly used navigational aids: ADF (Automatic Direction Finder), VOR (Very high frequency Omnidirectional Range), DME (Distance Measuring Equipment), and ILS (Instrument Landing System). These navaids are used for both day and night flight navigation. They are located on the pop-up instrument panel. Press [I] to toggle the pop-up panel on and off.

Automatic Direction Finder (ADF)

ADF is used with Non-Directional radio Beacons (NDB's). When the ADF receiver is tuned to an NDB, the needle on the bearing indicator (see Figure 5) points to the station and shows its bearing relative to the nose of the aircraft (its relative bearing). Magnetic bearing to the station can be calculated by adding the relative bearing to the magnetic heading. Check your Stealth Mission maps for any NDB's that may be listed in the mission scenario you are flying.

One default NDB is always located at your home base, and may be tuned by setting your ADF to 000. A second NDB (tuned by setting frequency to 001) lets you track the refueling tanker in addition to the VOR method described below. These two special NDBs have infinite range. Other NDBs have a range of approximately 80 miles.

ADF frequency is set with the [7], [8], and [9] keys. Press [7] to cycle through and select an ADF "hundreds" digit. Use the [8] and [9] keys to cycle through and set the "tens" and "ones" digits respectively.

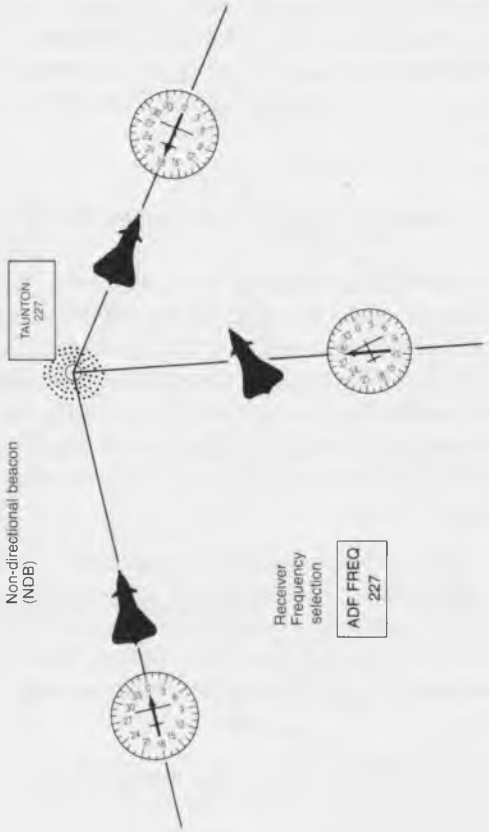


Figure 5. Automatic Direction Finder (ADF)

Very High Frequency Omnidirectional Range (VOR)

VOR's are radio stations that transmit an omnidirectional synchronization signal followed by a circular sweeping directional signal. The VOR receiver in the aircraft decodes these signals to determine what angle or what "radial" you are on relative to that station. Radials can be thought of as directional beams that radiate outward from the VOR station like the spokes of a wheel (see Figure 6).

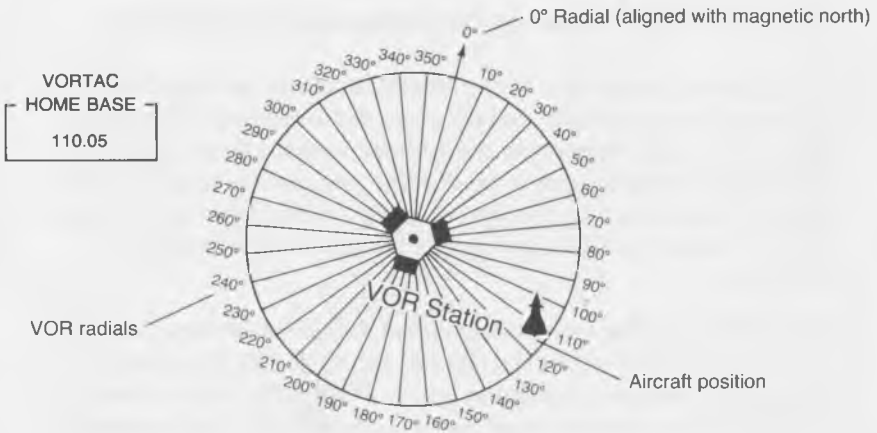
The VOR Indicator (sometimes called the Omni-Bearing Indicator, or OBI) is located just to the right of the VOR FREQ receiver. This instrument lets you determine which VOR radial you're currently flying on. The compass heading of your aircraft doesn't matter, except that as you continue to fly you may cover enough angular distance with respect to the VOR station to change your current radial. The VOR indicator helps you to fly up and down radials toward or away from a VOR station.

The OBI consists of the following components (see Figure 6):

Course Deviation Indicator (CDI): This vertical needle shows your deviation from the selected radial (the number at the top of the OBI). The crosshairs line up exactly twice during an entire sweep of the compass — once as you line up with your current FROM radial, and again when you find the TO radial.

Course Selector: This is the numeric value that appears at the top of the OBI. This number shows you what radial is selected to work in coordination with the CDI. At the bottom of the OBI is the heading exactly 180 degrees opposite the currently selected course.

Course Selector Knob: A knob is used to adjust the course selector on a normal OBI. Here you can use the [*] and [@] keys to increase or decrease the value set on the course selector.



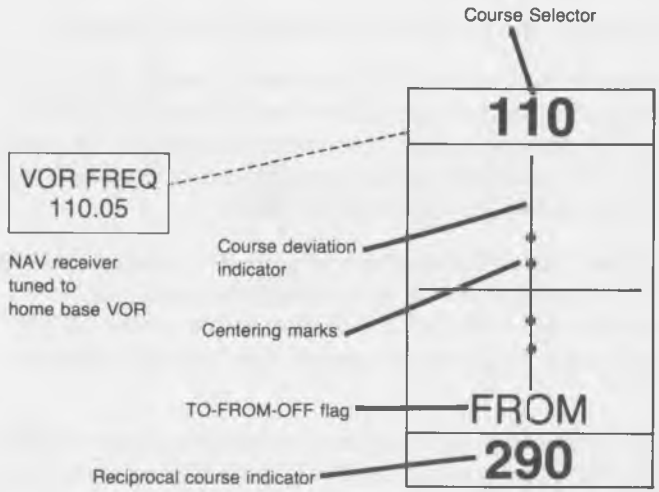


Figure 6. VOR Station, Radials, and Indicator

TO-FROM-OFF Indicator: This indicator shows whether the course set on the course selector takes the aircraft TO or FROM the station. OFF indicates an out of range station, or no active station for the currently selected VOR frequency. The home base and refueling plane VORs have infinite range. Other VORs have a range of 80 miles.

Tune the desired VOR by adjusting the value in the VOR FREQ box just to the left of the OBI. Use the [;] and [:] keys to increase and decrease VOR frequency respectively. Default frequency is set to 110.05 to receive the home base VOR. The refueling plane VOR frequency is 110.15.

Here are some important facts about VOR readings:

1. The VOR indicator only tells you what radial you are on. It says nothing about the direction the aircraft is flying.

2. As you adjust the course selector, the needle will center twice — once with the TO flag showing, and once with the FROM flag showing.

3. When you adjust the course selector until the CDI needle centers and the TO-FROM flag indicates FROM, you can read the radial number on the course selector.

4. When the needle is centered, the course selector shows the heading you must fly to go TO or FROM the VOR station (based on the TO-FROM flag).

5. When flying toward or away from a station, the CDI needle will move to the right of center if you are off course to the left of the radial. To get back on course, change your heading a bit to the right and fly "toward the needle."

6. You can use the TO or FROM needle-centered position to fly to or from a station, but if you fly from a station with a TO flag showing, the CDI needle will be reverse-sensing (moving backwards if you get off course).

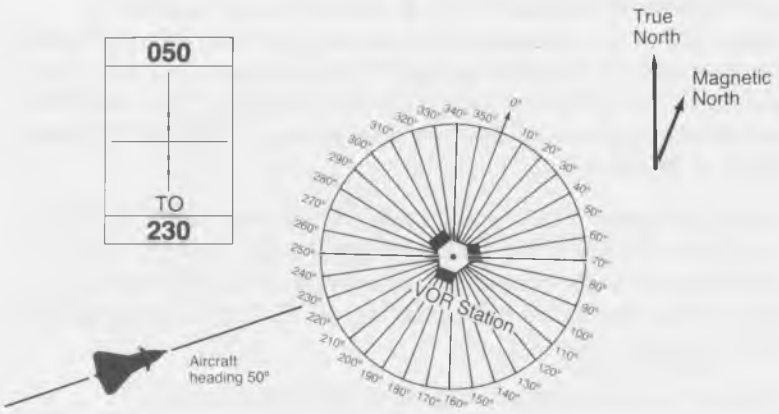


Figure 7. Flying to a VOR Station

Flying Toward a Station

1. Select a VOR station on the map and tune your VOR FREQ receiver to that station. (Refer to Figure 7.)

2. Adjust the course selector until the TO-FROM flag reads TO. If the OFF flag appears for all OBI settings, you are either too far from the VOR station or the frequency selector is improperly tuned.

3. Adjust the course selector until the CDI (vertical needle) is centered. Make sure the TO flag is still showing.

4. The magnetic course to fly TO the station can now be read on the course selector.

5. Take up the course indicated by the course selector. This will fly you right to the VOR station.

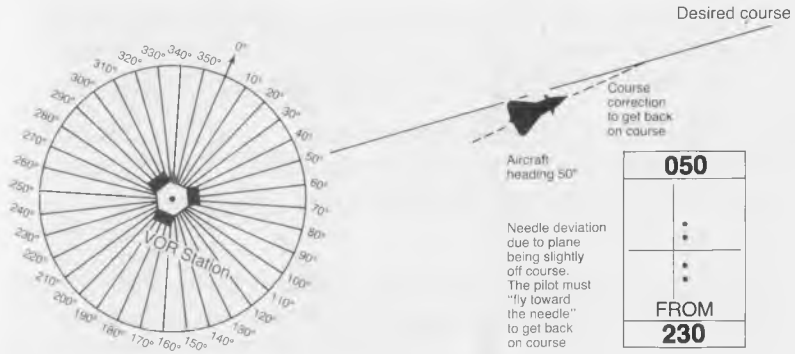

Desired course
Course correction to get back on course
Aircraft heading 50°
Needle deviation due to plane being slightly off course. The pilot must "fly toward the needle" to get back on course
050
FROM
230
VOR Station

Figure 8. Flying from a VOR Station

Flying Away From a Station

1. Select a VOR station and tune your VOR FREQ receiver to that station. (Refer to Figure 8.)

2. Adjust the course selector until the TO-FROM flag reads FROM. If the OFF flag appears for all OBI settings, you are either too far from the VOR station or the frequency selector is improperly tuned.

3. Adjust the course selector until the CDI (vertical needle) is centered. Make sure the FROM flag is still showing.

4. The magnetic course to fly FROM the station can now be read on the course selector.

5. Take up the course indicated by the course selector. This will fly you away from the VOR station.

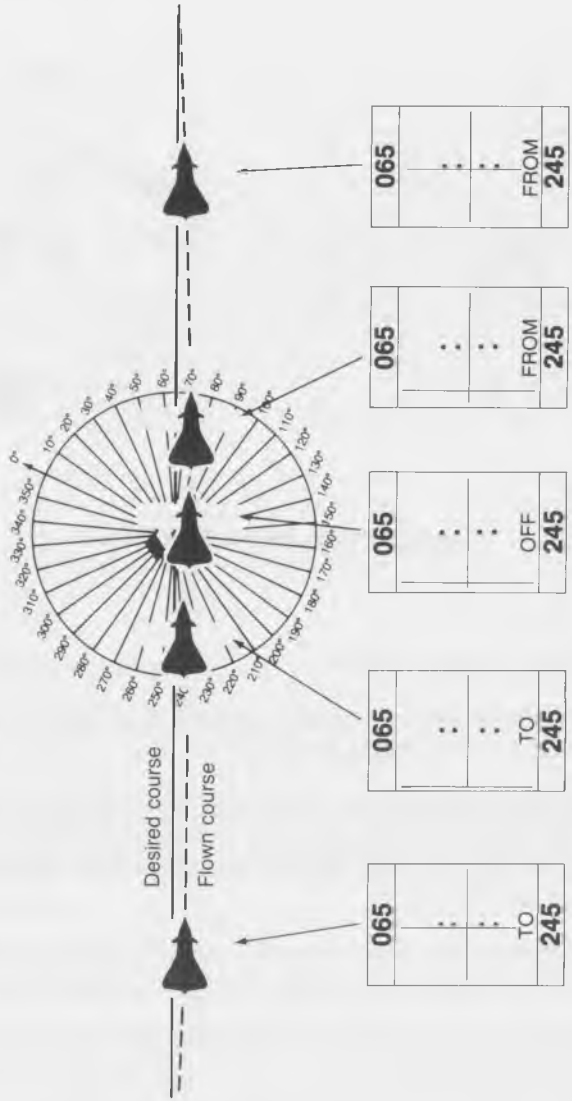


Figure 9. VOR Passage

Station Passage

1. Select a VOR station that you want to fly past (TO on the selected radial and FROM on a radial of about 180 degrees difference). Tune it in, and fly TO it. (Refer to Figure 9.)

2. When you get very close to the station, the needle will become hard to track. Radials are close together near the station from which they radiate, and even small course errors show large deviations.

3. Don't chase the needle or try to keep it centered. Instead, fly straight on the heading indicated on the OBI until you get to the other side of the station.

4. You will very rarely fly right over a VOR station. If that station is a fair distance to the right or left of you (usually a mile or more), the OFF flag will appear indicating an abeam position and the CDI needle will pin itself to the side of the VOR guage toward the station. You then know on which side of the station you are passing.

5. Shortly after station passage, the FROM flag will appear. Assuming you held your heading firm, the CDI needle will be nearly centered. You are now flying FROM the station as intended.

Distance Measuring Equipment (DME)

The DME is located to the left of the OBI, just below the VOR FREQ receiver. This instrument displays distance in nautical miles to the tuned VOR station. If no active VOR is tuned in or the tuned VOR is out of range, the DME displays dashed lines only.

Instrument Landing System (ILS)

Airport ILS transmitters are used to coordinate a runway landing approach. When the VOR FREQ receiver is tuned to an ILS transmitter, the horizontal glideslope and vertical course deviation indicators on the OBI are used to align your aircraft with the runway. You are on the correct flight path when both needles are centered. ILS approaches are not available on the Stealth Mission disk, but can be found on optional scenery disks. Outer, Middle, and Inner (OMI) marker lights are also available on scenery disks. Refer to an instrument flying handbook for additional information on instrument approach techniques and how to use this instrument.

Radio nav-aid controls are listed in Figure 10.

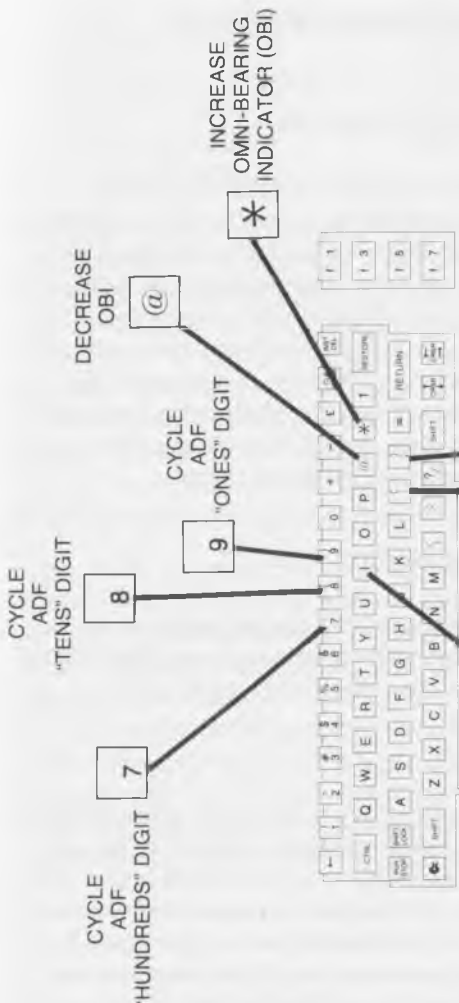


Figure 10. Stealth Mission Radio Controls

Weapon and Defense Systems

Targeting Crosshairs

Targeting crosshairs are toggled on and off with the [R] key. These crosshairs are superimposed over the center of the out-the-window screen display. They are used as a sight for cannon fire, and in conjunction with the target-tracking computer to lock onto and fire weapons at enemy targets. The crosshairs may also be used along with the attitude indicator to determine the exact pitch attitude of your aircraft when flying. Because of scenery color variations in the out-the-window view, crosshair color can be adjusted for maximum contrast. Press the [U] key repeatedly to cycle through and select from sixteen different colors.

Fire Control

Fire control systems consist of a weapons cycling window and a target-tracking computer. These instruments surround the ZOOM indicator in the lower right corner of the heads up display.

Weapons Cycling Window

An orange bar in the weapons cycling window (left of the ZOOM box) indicates the currently selected weapon. Weapon icons are displayed in Figure 11. Other available weapons listed below the selected weapon may be cycled through and selected in turn by pressing the [RETURN] key. Small squares to the right of each weapon icon indicate the number remaining. The quantity and type of ordnance you carry is initially set on the Skill Level selection menu (see Menu Selection). The type and sequence of available weapons is as follows:

AIM-9 SIDEWINDER	GBU-528 BOMB
AIM-7 SPARROW	AGM-84 HARPOON
AGM-65 MAVERICK	STEALTH A-A
MK-81 BOMB	STEALTH A-G
MK-82 BOMB	M61
MK-84 BOMB	

Only air-to-air missiles and your M61 machine gun can be used against enemy MiG fighters. The AIM-9 "Sidewinder" is a short range (10 miles) heat-seeking missile well suited for close-in combat because of its accuracy and light weight (see Figure 11). The AIM-7 "Sparrow" is a radar-homing missile with a range of 40 miles. The main disadvantage of this missile is its weight. Aircraft radar guidance of the AIM-7 is essential until it hits the target. The AIM-9 uses its own heat-seeking guidance system once fired. The Stealth A-A air-to-air missile is functionally similar to the Sidewinder, but is undetectable after it has been launched.

Only air-to-ground missiles and bombs can be used against ground targets. The AGM-65 is a medium range (14 miles), optically-guided missile. It is quite accurate but its warhead is small and has a small hit radius. The AGM-84 "Harpoon" is designed specifically for use against ships. MK-81, MK-82, and MK-84 smart bombs have large warheads and a much larger hit radius, but their accuracy is limited since they have no propulsion systems. The GBU-528 cluster bomb is especially effective against runways. The Stealth A-G air-to-ground missile is functionally similar to the Maverick but is undetectable after launch.

After the M61 cannon, the weapons cycling window returns to AIM-9 missiles and recycles through the list of available weapons. Once a weapon is selected and an appropriate target is locked, you can fire that weapon by pressing the [space bar]. When you run out of a particular weapon, you can select another weapon type or go back to any friendly airbase or the refueling plane to re-arm.

AIM9	:	Short range (10 miles) heat-seeking air-to-air missile. Sidewinder needs no further guidance from the fighter once launched. Accurate and especially good in close-range combat. Weight 160 lbs.
AIM7	:	Medium range (40 miles) radar-homing air-to-air missile. Sparrow weighs 500 lbs, almost three times that of a Sidewinder.
AGM-65	:	Medium range (14 miles) optically-guided air-to-ground missile. Maverick is very effective against SAM sites. Deadly accuracy makes it ideal for precision strikes. Weight 460 lbs.
MK-81 MK-82 MK-84	:	"Smart" bombs, no propulsion systems. Track a point on the ground. Limited accuracy, large warheads, large hit radius. MK-81 weight 500 lbs. MK-82 weight 1000 lbs. MK-84 weight 2000 lbs.
GBU-528	:	Radar-guided cluster bomb, carries fifty 10-pound bomblets. Very effective against runways. Weight 500 lbs.
AGM-84	:	Long range (60 miles) anti-ship missile. Harpoon weighs 1040 lbs.
ST A-A	:	Short range (10 miles) air-to-air heat-seeking missile. Stored internally in the Stealth aircraft. Functionally similar to the Sidewinder but with low stealth profile, difficult to detect in flight. Weight 190 lbs.
ST A-G	:	Medium range (12 miles) air-to-ground missile. Stored internally in the Stealth aircraft. Functionally similar to the Maverick but with low stealth profile, difficult to detect in flight. Useful to take out runways, etc. before enemy planes can take off. Weight 390 lbs.
M61	:	20 mm cannon. Six-barrel machine gun can fire up to 100 rounds per second at a velocity of 3400 feet per second. 640 rounds are included in each reload.

Figure 11. Stealth Mission Ordnance

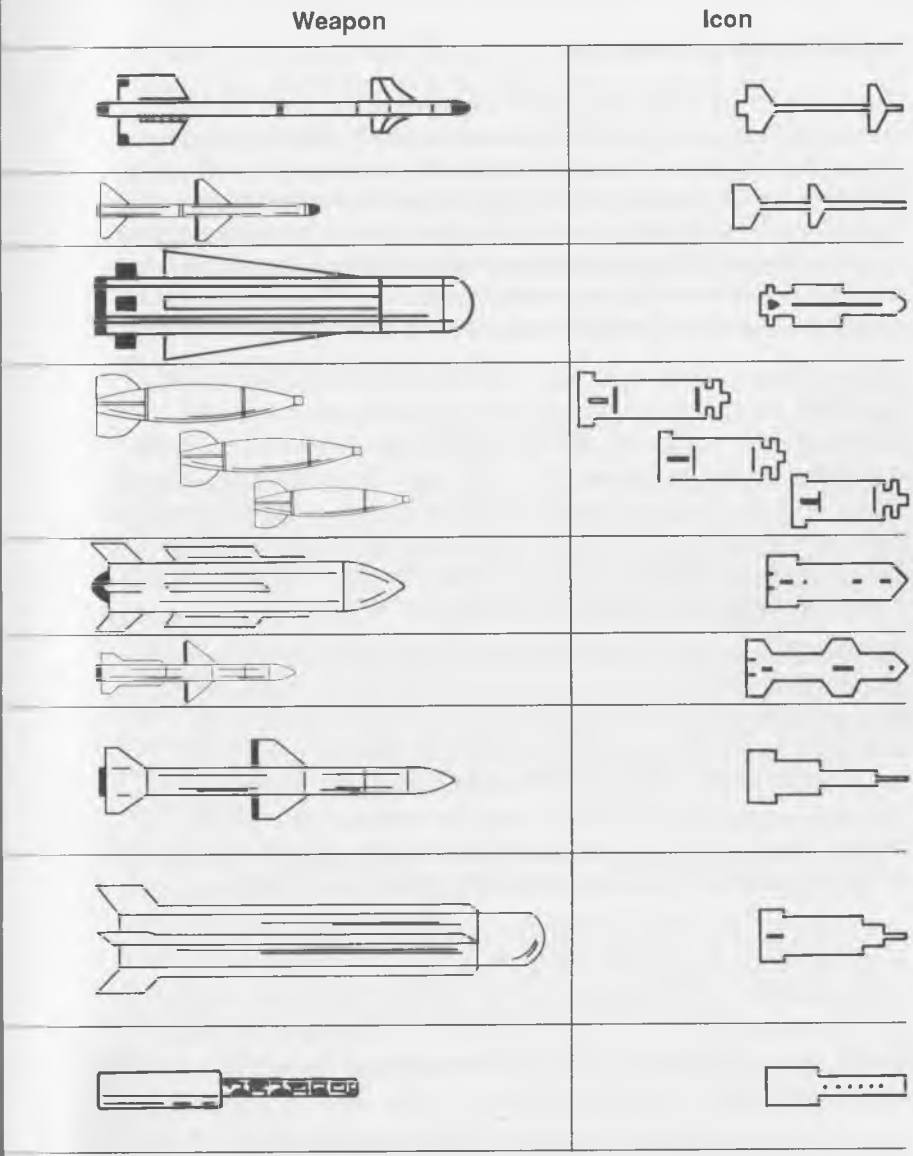


Figure 11. Stealth Mission Ordnance (cont.)

Target-Tracking Computer

The TARGET tracking computer is located above the ZOOM indicator. This computer locates and tracks all potential enemy targets for the current selected weapon type (air or ground), and lists distance in nautical miles to the target currently being tracked. Only targets appropriate for the current selected weapon type are tracked. If more than one target has been located, you can press the [up arrow] key to cycle through all potential targets in sequence and view the distance to each in turn as it is tracked.

Targets flash as they come into view through your cockpit window, and a red auto-targeting box is superimposed over the current target. You must position the targeting crosshairs within the targeting box and press [L] to lock onto the target one or more times. If more than one flashing target is visible, you can press the [up arrow] key to cycle to it and center it within the auto-targeting box. Targetting crosshairs must be repositioned within the targeting box for each new target before you can lock onto it.

Numbered icons are displayed along the bottom of the target-tracking computer for each locked target (to a maximum of four). Blue icons represent locked ground targets, and violet icons indicate locked air targets. Icons indicate only the number of target locks you've made, not the number of targets themselves. The same target can be locked onto four times if desired. Any enemy target must be selected and locked onto before you can fire at it. All target locks can be cleared by pressing [CTRL][L].

Once you've locked onto a target you may fire the active weapon. Press the [space bar] or the firebutton on your joystick one or more times to cycle through and fire at all of the locked targets in turn, or press key [1], [2], [3], or [4] to fire at that specific locked target. Be sure that the target is within range of the active weapon before you fire.

Air-to-air missiles automatically track the target and detonate if they come within hit radius. Air-to-ground missiles and bombs

detonate on impact, and destroy the target if it lies within the hit radius. You will hear an explosion when a target is hit.

When you run out of targets or ammunition, you will have to return to home base (or the refueling plane). Any remaining enemy SAM sites will continue to fire missiles at you if they detect your presence, and remaining MiGs will continue to chase you. You must land (or dock with the refueling tanker), refuel, repair, and re-arm before you can continue combat. Your aircraft is automatically re-armed with the same initial quantities and types of armament each time you refuel.

Raw Scope

A raw scope located to the right of the OBI on the pop-up instrument panel lets you monitor active radar systems external to the aircraft. The raw scope computer constantly analyzes the airwaves for radar frequency emissions known to be used by enemy radar systems (both air and ground-based), and displays a relative vector heading on the scope for each radar system (up to 10) it detects. A red-lit GND icon on the scope indicates an active radar signal emanating from a ground site. Blue-lit AI icons indicate air-intercept radar signals. Only two of each icon type are available; additional vectors are plotted on the scope without identification.

If you are within range of enemy weapons, one or more enemy missiles will probably be launched immediately. Radar signals from these missiles or from ground-based missile guidance systems are detectable as well. A flashing blue LNCH icon on the raw scope accompanied by a loud beeping noise indicates that one or more enemy missiles have been launched at you.

Because of the curvature of the Earth and reflectivity of objects on the ground, flying at very low altitudes (around 150 feet) can minimize your chances of being detected by enemy radar.

Radar

Radar is toggled on and off with the [W] key. This instrument displays the relative locations of all potential ground-based targets, airborne targets, and missiles within a twenty-mile radius of your aircraft. All three types appear as white dots on the radar display. The radar screen is especially useful for tracking enemy aircraft and missiles when they are not visible out the window.

You can differentiate between ground-based targets, aircraft, and missiles on the radar display by turning each on and off with the [,], [/], and [.] keys respectively. The RADAR: T A M icon is located to the right of the clock. The T label, when present, indicates that ground targets are included in the radar display. Press [,] to toggle the T on and off. The [/] and [.] keys turn the A and M labels on and off similarly to indicate the inclusion or exclusion of aircraft and/or missile dots on the radar display. When flying the F-19 Stealth jet, keep in mind that using radar will compromise your stealth profile.

Hits

The HITS display box (located to the right of the raw scope display, below the landing gear icon) keeps track of your hits on ground and air targets. This box is divided into four columns. Two left columns keep track of hits made against air targets, and the right pair of columns keep track of ground target hits. Within each pair of columns, icons in the left-most column represent ten hits each while right column icons represent individual hits. Only hits against military targets are counted.

Electronic Counter-Measures (ECM)

Modern-day defensive tactics include using the most sophisticated electronic counter-measures (ECM's) possible. Stealth Mission jets incorporate three different types of ECM; radar

jamming, chaff, and flares. Radar jamming is used to confuse enemy radar and communications, chaff to passively confuse enemy radar imaging, and flares to draw away enemy heat-seeking missiles. Indicator icons for these three ECM's are located above the clock in the lower left portion of the screen display.

Your ECM jammer hinders enemy radar and enemy internal communications with a 95% degree of certainty. This jammer is toggled on and off by pressing the [CTRL][J] keys. A flashing JAM icon label indicates that active radar jamming is taking place.

Your jet can carry a maximum of thirty flares and thirty bursts of chaff. Orange indicator bars labeled C and F decrease in height each time chaff or flares are used, and disappear when supplies are exhausted. Chaff and flares are replenished by refueling at any friendly airbase or at the refueling plane.

Chaff

Radar-guided missiles tend to home in on the best available target. Because of the radar-absorbing materials used on just about every modern jet fighter, the radar-emitting profile of these aircraft is typically very restricted. For these reasons, chaff can be used to successfully fool incoming radar-guided enemy missiles. Chaff is a highly-reflective-to-radar substance (similar to diced aluminum foil) that, when released, clouds and hangs in the air for several seconds after you've passed. Ideally, this cloud of chaff will cause an incoming missile to think it has found a new and better target on which to expend its warhead. If you're lucky, the proximity fuse on the warhead will decide that it's about as close to an alumnimum target as it's going to get, and detonate the missile's warhead. If you're not quite so lucky, it may be fooled only temporarily and be led off-course for several seconds. This can give you enough time to veer out of range, or cause the missile to run out of fuel before it can catch up with you. Missiles expend a lot of fuel when changing directions. Press [CTRL][K] to release one burst of chaff.

Flares

Infra-red (IR) missiles are drawn towards heat sources such as the jet engines of your aircraft. They are not fooled by clouds of chaff, but can be misled by heat-emitting flares. Press [CTRL][O] to launch a flare.

If an enemy aircraft spots you before you see him, he may sneak up behind you and fire a heat-seeking missile which you might not be able to detect in time. Your aircraft is equipped with rear-viewing radar but, unfortunately, activating it can alert the entire area to your presence. Enemy forces know that you will release chaff in front of radar-guided missiles, so be on guard for heat-seeking missiles cloaked in radar emissions. You might be best off using both chaff and flares, just in case your first guess regarding incoming missile type is incorrect.

Damage Indicator

A red DAMAGE indicator bar is located above the thrust indicator. This bar indicates the amount of damage your aircraft has sustained. Twelve separate systems are monitored for damage as you fly, and total aircraft damage is indicated by the length of this bar. Damaged systems are repaired when you refuel at a friendly airbase or at the airborne refueling plane. Systems which may be damaged (by incoming missiles, etc.) include:

2 fuel tanks	raw scope
engine(s)	radar display
ECM	landing gear
VOR	weapons selection
ADF	weapons firing

In most cases, damaged systems are unusable until repairs are made. Two exceptions to this rule are fuel tank and engine damage:

If a fuel tank is damaged you will begin to lose fuel quickly, but you may still be able to fly toward a friendly airbase or refueling plane. Fuel leaks out even more quickly if both tanks are damaged.

Two levels of engine damage are tracked. Initial damage to an engine decreases maximum thrust availability to only 65% of full power. After a second hit the engine becomes useless. You can then either attempt to glide down to a safe landing, or eject and let your aircraft take any last incoming missile hits. One last glance for a flashing LNCH icon on the raw scope should help you decide.

When a system is hit by incoming fire, its onscreen instrument/indicator turns yellow and the red damage indicator bar length is increased appropriately. For example, a yellow GEAR icon indicates that landing gear has been disabled. At skill level 0 your aircraft may be hit, but damaged system icons do not turn yellow and the system remains functional.

Ejection Seat

If your aircraft becomes critically disabled, your final option may be to eject and take your chances with any enemy ground troops you may encounter. Press [CTRL][E] to eject from the aircraft. You can use spot plane view to watch yourself exit the cockpit, pop your parachute, and float to the ground. When you land, the mission automatically ends and a summary of your performance is displayed. Weapon and defense controls are listed in Figure 12.

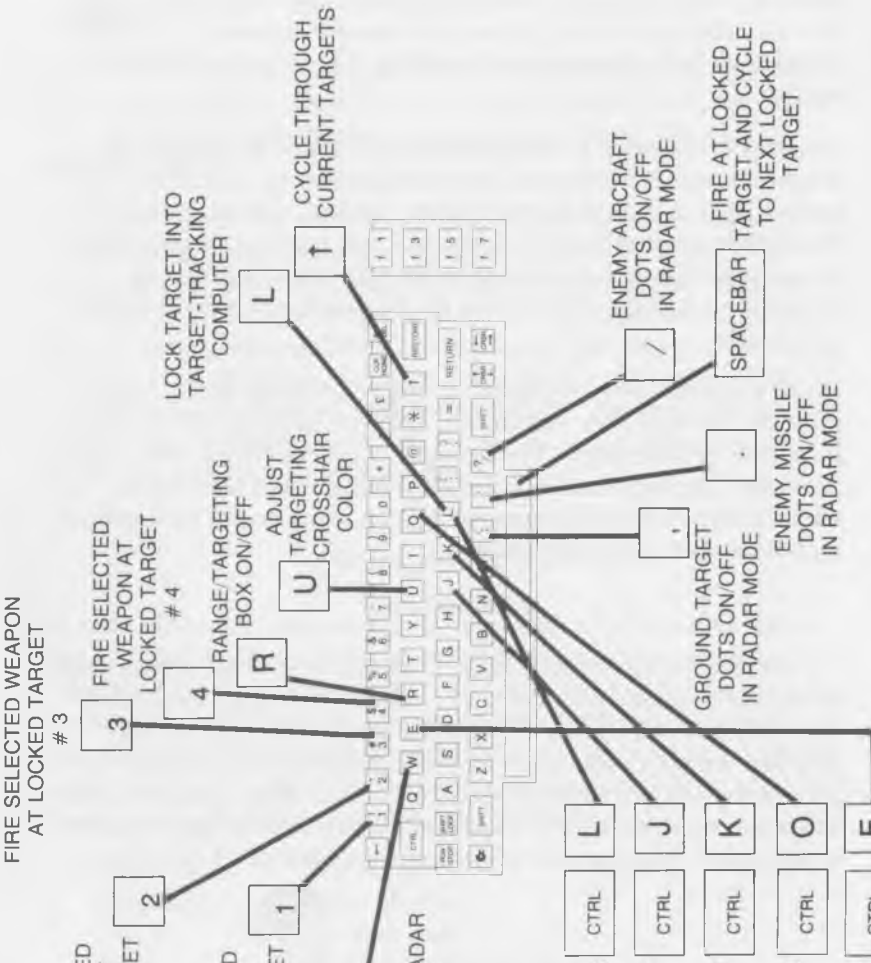


Figure 12. Weapon and Defense System Controls

Missions

The Stealth Mission world of 10,000 by 10,000 square miles includes four different areas that offer a variety of lifelike aerial combat situations. Two missions, one easier and one more advanced, are available for each area. Easy missions are less heavily defended against attack.

Your primary objective on any stealth mission is to destroy the primary target(s), and secondly to inflict as much damage as possible on the enemy. A message superimposed over the out-the-window view indicates when a primary target has been hit, and another message is displayed when all ground targets have been destroyed. Points are awarded based on the importance or difficulty of targets hit. You lose points for hitting civilian targets. Civilian target locations are learned by experience and reconnaissance. You may want to fly over an area before reviewing it on the map, to learn how much of the area can be safely reconnoitered in the F-19 Stealth aircraft.

Mountain Conflict

An enemy stronghold is situated in the mountains NNE of your home base. You must inflict damage on enemy military targets and bridges in order to limit the enemy's aggressive westward expansion.

One important target in the valley is the headquarters installation. Be wary of mountaintop surface-to-air missile (SAM) sites that may be difficult to locate. Military targets are located in the north end of the valley. Watch out for enemy MiG-21 and MiG-23 interceptors.

Battle at Sea

You are stationed on an island dangerously close to enemy territory. A mountain range shields you from enemy detection. A small enemy interceptor base located to the north of you is heavily protected by SAMs (on nearby islands) and guided missile frigates. You will require the refueling and re-arming capabilities of the refueling tanker which flies a circuit NNW of enemy territory. You may run out of weapons before finishing the first objective.

A second objective lies northeast of the first, protected by guided missile frigates and SAM island sites but no interceptors. Navigate carefully because you will be flying over open sea most of the time.

Ancient Ruins

Enemy forces have turned the ruins of an ancient civilization into a base headquarters. This ancient civilization constructed a system of plateaus whose purpose can now only be guessed at.

A fighter base on the near side of the site may be captured for refueling and re-arming. The best approach is to stay below the rim of the plateau as much as possible, since any SAM sites on top of the plateau cannot detect you there. Unfortunately, this strategy makes it very difficult for you to hit targets located on top of the plateau. If you fly through the canyons between the plateaus, be sure to keep your airspeed low enough to negotiate sharp turns. Beware of SAM sites in the canyons.

Marathon Bomber

This mission tests your stamina. You may have to fly long distances for fuel and arms unless you can capture them from the enemy. Your first objective therefore should be to capture the

enemy's nearest interceptor base and use it to supply yourself with fuel and arms for the rest of the mission. The interceptor base is protected by SAM sites. You must eliminate them without destroying the base runways. There are civilian targets in this region as well, so be careful. Civilian targets generally can be distinguished from military ones by their lack of radar emissions. Another enemy base may be captured at the west end of the enemy's military zone.

Your main objective is a set of very large runways near the center of the enemy's military zone. This objective is also protected by SAM sites and interceptors. You will have to fight your way into and out of the military zone, and you will run into a lot of enemy defenses along the way.

Mission Strategies

You will have to develop your own approach to each mission scenario. Record all signs of military buildings. Make sure you have enough of the right armament before you attack strongholds. Keep track of your fuel, and keep enough in reserve to return to a re-arming/refueling facility. If you have to fight your way to fuel and arms, be sure you have enough of the right kind of munitions. Remember that the aircraft must be completely refueled before it can be repaired and re-armed.

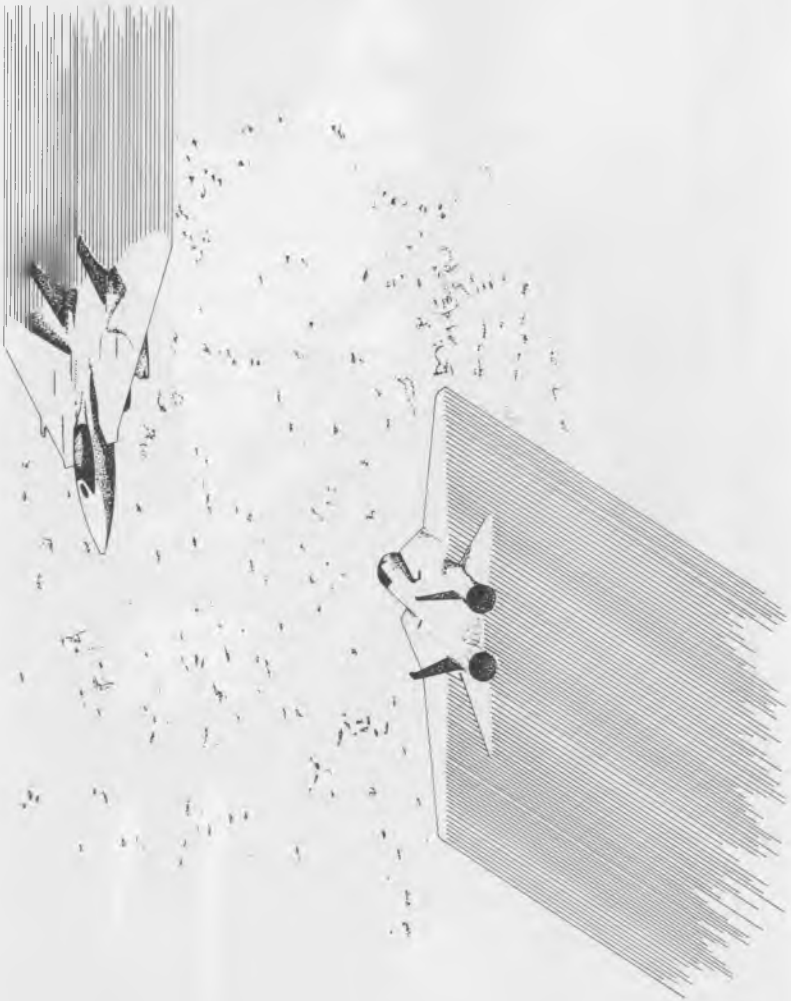
When attacking a SAM site or guided-missile frigate, head straight for the target, fire your weapon(s) at the proper distance, then turn 90 degrees to the right or left. Maintain a relatively close distance to the target until your weapons hit, in case you have to make another pass. Don't keep flying toward the target after firing your weapons. You will probably be detected and fired upon. If an arcing course takes you into the path of another SAM site, it may also detect and fire upon you. You should either evade it or destroy it. To use an enemy airbase as a repair/refueling

facility, you must eliminate all surrounding SAM sites without destroying the airbase runways.

A mission summary page is displayed at the end of each mission. This summary also provides a score based on your performance:

```
MISSION TIME :
MISSILES USED :
GROUND TARGETS HIT : 0 / 0
ENEMY AIRCRAFT HIT :
CIVILIAN TARGETS HIT :
PRIMARY TARGETS HIT : 0 / 0
FINAL SCORE :
```

Your score is based on the number of enemy ground and air targets destroyed. When more than one number is displayed in a specific category, the first indicates number of destroyed targets while the second lists the total number of possible targets. You lose points for each civilian target hit.



Situational Tactics

Aircraft Differences

The F-19 Stealth aircraft is the slowest and least maneuverable of the three jets you can fly. Its unique advantage is its stealth capability. The X-29 is fast, small, and extremely maneuverable, but it carries the least amount of payload. The F-14 Tomcat is moderately slow in turning but fastest overall, and can carry much more armament than the others.

The F-19 carries its relatively small armament load internally to prevent compromising its stealth radar profile. This aircraft cannot be detected by enemy radar, but can be detected visually if you fly within one mile (at skill level 0) to three miles (at skill level 9) of an enemy emplacement. Your presence will also be detected if you use radar to track enemy targets, turn on the ECM jammer, or fire any weapons other than stealth air-to-air or air-to-ground missiles. This aircraft would probably best be used to clear the way for the heavy weapons carriers in an actual combat situation, by first eliminating some crucial pinpoint targets. The F-19 could be used to sneak up on and knock out the most critical fire-control radar antennas, for example.

Choose your aircraft according to the needs at hand.

Dogfight Situations

Setting the appropriate zoom factor can be very important in a dogfight. At greater distances, higher zoom factors (4-16X) can greatly facilitate accurate weapons fire. During close-in fighting, the lowest zoom factor (1X) increases your field of view and can ease target acquisition and tracking. Viewing the battle from the control tower can help you determine the altitude of enemy aircraft. You may want to get into the habit of scanning several

view directions during a dogfight to get a better overall perspective on your environment.

Enemy Aircraft

There are two types of enemy jets, MiG-21s and MiG-23s. Both appear black and white in your out-the-window view. The MiG-21 has a fixed wing, while the MiG-23 uses a variable-geometry swept wing. These jets utilize the same flight equations as your jet, but are less maneuverable since they weigh more and have less thrust. MiG-21 and MiG-23 aircraft also have lower-powered radar than any of your aircraft. The MiG-21 is quite limited in most aspects except speed and agility.

In a dogfight, MiGs track your aircraft and fire Atoll air-to-air missiles if they get within range. These missiles track you in turn, and detonate if they come within the hit radius of the aircraft.

Ground Target Strikes

Again, high zoom factors can increase the accuracy of weapons fire. When dropping bombs, remember that although they home precisely to the point you designate at launch time, they do not compensate for gravity. On shallow flight paths, they may fall short of the target. One way to correct for this homing error is to fire your weapons from a high pitch angle, but this puts you in greater danger of being detected by an enemy SAM site. You can also compensate by aiming at a homing point slightly beyond the target.

SAM Sites

Enemy SAM sites can only detect you within a conical airspace directly above them. If you pass within this space they will detect

and fire upon you, so you should fly as low to the ground as possible near the target you are attacking. If you are hit with a surface-to-air missile, one or more aircraft systems may be damaged or destroyed.

Missile Avoidance

There are two ways to increase your chances of survival when you detect an approaching enemy missile. First, you can try to evade the missile. This is difficult because of its faster speed and smaller turning radius, but tracking imperfections can cause the missile to miss you. Also, a missile runs out of thrust very quickly and loses speed rapidly as it begins to coast. A second way to increase your chance of avoiding the missile is to move at a right angle to its flight path. This will keep it turning, wasting energy and homing accuracy until its fuel is spent.

Loading Scenery Disks

When you select option 2, Load Scenery Disk, the following menu appears:

```
SCENERY DISK

NORTH - >17189
EAST  -  16671

ENTER EACH STARTING LOCATION
AND PRESS RETURN.
PRESS CTRL S FOR A NEW SCENERY DISK.
```

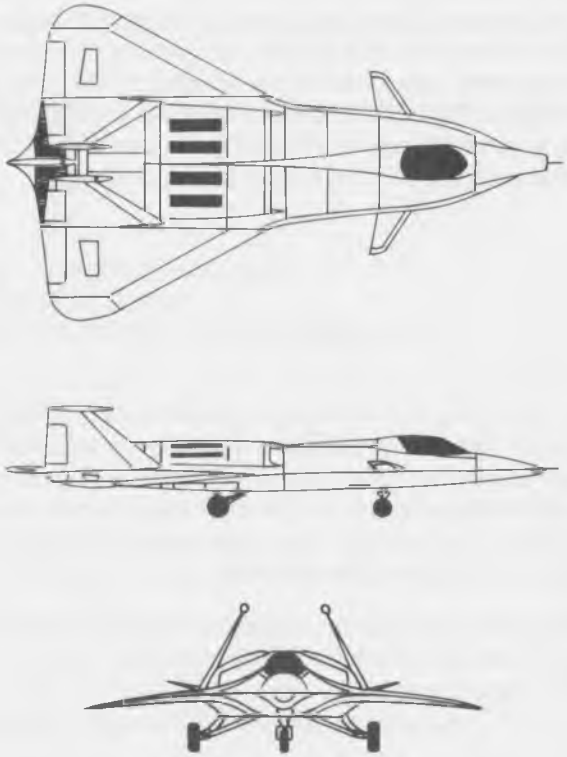
SubLOGIC offers scenery disks that allow you to fly over "real world" landscapes covering almost all of the United States, and parts of Japan and Europe. North and East coordinates are used to place your aircraft anywhere within the area covered by the scenery disk with 256 meters accuracy. Each scenery disk provides maps that give the coordinates of all available airports.

Insert the scenery disk into your disk drive when prompted by the Stealth Mission program, and enter the North and East coordinates of the airport from which you would like to start. Altitude coordinates are automatically read from the disk.

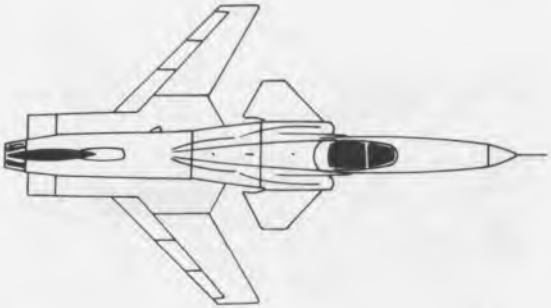
A > symbol appearing to the right of the NORTH label indicates that you should enter a North coordinate. Type a (maximum) five-digit number here to set the north coordinate of your desired starting location. You may use the [DEL] key to change a mistake. Press the [RETURN] key to leave a coordinate as it is without changing the number. When both coordinates have been entered, press [RETURN] again to load the scenery disk into memory. Upon leaving the Load Scenery Disk screen, you are transferred to the Skill Level Selection menu and may proceed as usual.

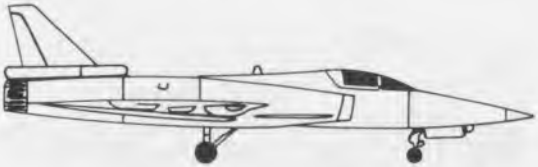
Once in flight mode, you should find yourself sitting on or near a runway at the selected airport. (If no airport is visible, you may want to doublecheck your coordinates.) Control tower view becomes the view from this airport, and you can fly anywhere within the scenery areas located on this disk. When changing scenery disks (to fly into the area covered on an adjacent disk, for example), you must press [CTRL][S] to log-in the new disk. Scenery disks do not contain enemy bases, targets, etc.

Aircraft Technical Data

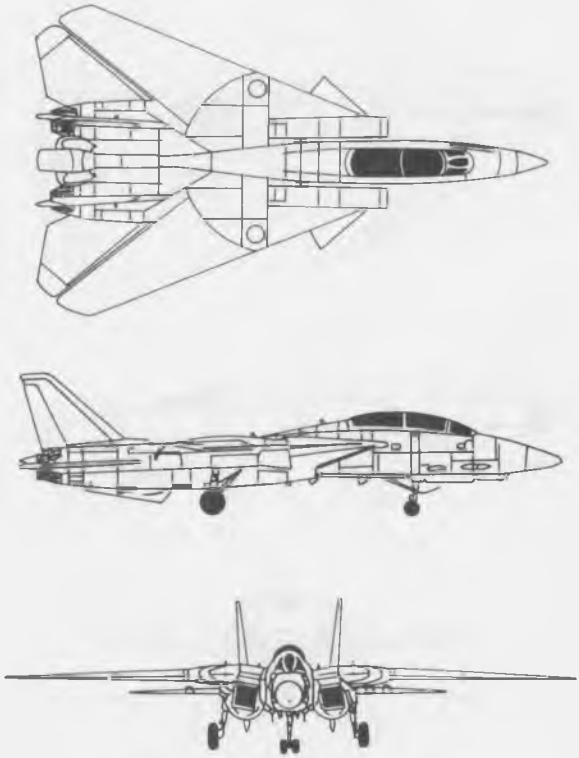


Aircraft:	F-19 Stealth
Wing Span	31 ft 8 in
Length	59 ft
Height	13 ft 1 1/2 in
Fueled Weight	22050 lb
Maximum Weight	33070 lb
Maximum Thrust	10800 lb X 2
Maximum Speed	845 mph
Combat Radius	460 miles

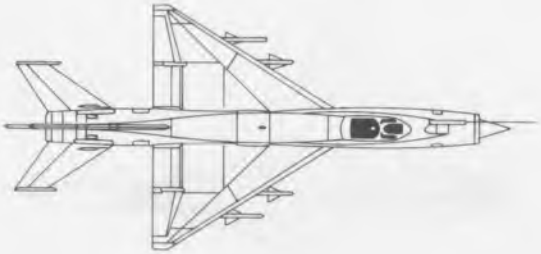


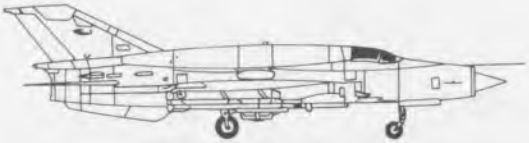


Aircraft:	X-29 Experimental
Wing Span	27 ft 2 1/2 in
Length	53 ft 11 3/4 in
Fueled Weight	13800 lb
Maximum Weight	17800 lb
Maximum Thrust	16000 lb X 2
Maximum Speed	1056 mph
Combat Radius	900 miles

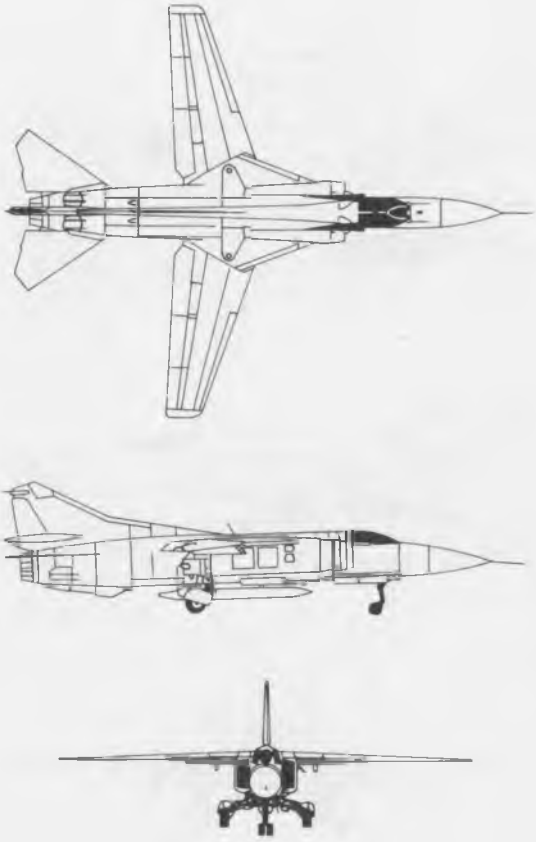


Aircraft:	F-14 Tomcat
Wing Span	38-64 ft (variable)
Length	62 ft 8 in
Fueled Weight	40104 lb
Maximum Weight	74349 lb
Maximum Thrust	20900 lb X 2
Maximum Speed	1544 mph
Combat Radius	2000 miles





Aircraft:	MiG-21
Wing Span	23 ft 5 in
Length	51 ft 8 in
Empty Weight	12400 lb
Maximum Weight	20725 lb
Maximum Thrust	14500 lb
Maximum Speed	1335 mph
Combat Radius	1100 miles



Aircraft:	MiG-23
Wing Span	26-46 ft (variable)
Length	59 ft 6 in
Empty Weight	18075 lb
Maximum Weight	41670 lb
Maximum Thrust	27500 lb
Maximum Speed	1550 mph
Combat Radius	800 miles

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